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THE IMPACT OF SOCIAL AND ECONOMIC FORCES ON ALCOHOL AND DRUG PROBLEMS IN ONTARIO

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The Impact of Social and Economic Forces on Alcohol and Drug Problems in Ontario

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THE IMPACT OF SOCIAL AND ECONOMIC FORCES ON ALCOHOL AND DRUG PROBLEMS IN ONTARIO

by

Manuella Adrian

Toronto, Ontario

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ABSTRACT

In the first part of this paper, the selection of alcohol and drug indicator statistical series for purposes of producing effective public education tools is discussed. The construction of a composite index of severity of the social burden of alcohol and drug problems using two methods, one based on relative ranks, and one based on index numbers is considered. This latter method is used to produce a map showing the relative burden of alcohol and drug problems for counties of Ontario, allowing the identification of counties with dangerously high problem levels, equal to more than twice the provincial average.

The second part of the paper examines the nature and extent of the relationship of alcohol and drug indicators to underlying economic and social conditions in the counties of Ontario, so as to delineate possible future trends in alcohol- and drug-related behaviours.

Speech presented to the Canadian Addiction Foundation Meeting

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Introduction

The Statistical Information Section was formed to meet the growing demand for statistical information on various aspects of alcohol and drug problems.

As part of our activities to meet this mandate, the Section produces a compendium of statistics entitled the Statistical Supplement to the Annual Report of the Alcoholism and Drug Addiction Research Foundation. Although this report is intended to be relatively comprehensive, and to contain answers to some of the most frequently asked questions, from time to time, we are faced with questions which cannot be answered by direct reference to it.

One of these questions is the following: "Where are the worst alcohol and drug problems?". One usually tries to answer this question by presenting a variety of statistical tables showing quantitative data on some aspect or other of alcohol- and drug-related behaviour.

Sometimes, for the convenience of the reader, statistics on several of these behaviours are presented in a single table (Table 1). The reader is then faced with having to judge which of these figures are indicators of "the worst problem".

In this paper, I will discuss the selection of alcohol and drug indicators for purposes of constructing a composite index of severity of the social burden of alcohol and drug problems for purposes of mapping out areas of grave concern. I will also discuss the relationship of alcohol and drug indicators to underlying socio-economic conditions delineating possible trends in alcohol and drug problems.

Index of Severity of Alcohol and Drug Burden

An index of the severity of the social burden imposed by alcohol and drug problems should be analogous to a thermometer reading: easy to read, understand and interpret, of direct relevance to the subject, and capable of focusing and enlightening public discussion and decision making. [1, 2]

The use of such an index is not a new idea. Composite summary indicators have been in use for many years, particularly in economics, where a great deal of experience has developed since the turn of the century in the construction and problems of interpretation of such indices as the Consumer Price Index (CPI). In the field of social statistics, work on constructing composite social indicators has only begun. [3]

What is a social indicator? A social indicator is a construct, based on observations. It is usually quantitative. It is intended to be a summary of "the salient features" of some aspect of social life, whether static or dynamic, in which we are interested.[4]

In the field of social indicators, composite indices have not frequently been attempted because of the difficulties of defining social problems, and of selecting the statistical series which are conceptually closest to the defined social concern and giving them a weight in the aggregated composite index.[5,6] This is a complex problem best illustrated through an example.

Let us consider the major effects of alcohol use on the user[7] (Table 2). A person with an alcohol problem can display a variety of behaviours and consequences of these behaviours. It is possible to follow the chronological effect alcohol can have on an individual in terms of himself, and in terms of how he relates to his environment. Alcohol consumption, which is considered here to be the initiating activity, can have effects which are immediate or deferred, short term or long term. These effects can be felt by the consumer personally, in a physiological or psychological sense, whether these effects be acute or chronic. They can affect him socially in terms of his transient or permanent environment, his family, friends, work, material well-being or financial security. The outcome of such activities ranges from total recovery to death, with intermediate steps consisting of recovery with

reduced physical, mental and/or social functioning which may or may not result in reduced life expectancy. Finally, a tentative axis of severity can be established from least severe which corresponds to alcohol consumption to most severe which corresponds to death.

In constructing a composite index, one has to determine which statistical series to include to best describe the situation. The statistical series to be selected should be valid, comprehensive and provide reliable measures of that aspect of human behaviour that we wish to examine. The series should be accurate and internally consistent, comparable from year to year and from jurisdiction to jurisdiction. In addition, they should be timely and up-to-date. Finally, concepts, classifications and definitions should be used consistently. [8]

For purposes of illustration, a variety of possible Ontario statistics on alcohol and its effects are shown in Table 3. Out of over 80 possible variables which can be considered for alcohol problems alone, about half actually have any quantitative values which can be associated with them. Some of these values are estimates, some are of a nonperiodic nature, and some series have severe overlap between one another. [9] At this stage of development of an index of severity of alcohol and drug problems, pragmatic considerations limit the number of statistical series which can be incorporated into the composite index.

Out of the long list of all potential variables, only a few will be sufficiently valuable to be retained, these being the ones most

likely to throw light on the many facets of that which we want to study.[10] In actual practice, one is additionally limited to using such data as are available.

The statistical series chosen for this study consisted of:

- alcohol consumption (ALCONS)
- alcohol offences (ALCOFF)
- alcohol morbidity (ALCMORB)
- alcohol deaths (ALCMORT)
- drug offences (DRG-OFFE)
- drug morbidity (DRG-MORB)

The variables are described in Table 4, which indicates the source of data, if the geographical region refers to county of residence or of occurrence of the event, and any other pertinent remarks on the nature of the data.

These particular events were selected because they are some of the most frequently used alcohol- and drug-related statistical series, the data are readily available from periodic administrative reporting systems, and finally, the data have already been compiled by the Statistical Information Section, with data for 1978 available for quick reference in the Statistical Supplement.

These data consist of administrative data collected by government agencies as part of their normal operating procedures.[11] The data are gathered with certain considerations for meeting the requirements described above. However, pragmatic administrative considerations limit the quality of the data.[12]

Each statistical series has its own inherent advantages and limitations. For instance, Ontario hospital morbidity statistics include information on all hospital separations for cases treated in general public hospitals in the province. Every effort is made to report every single case treated as hospital budgets may ultimately be affected. Medical conditions are classified under each diagnostic category in accordance with international standards. However, diagnosis is dependent on the medical bias of each physician. The statistics reported do not refer to sick persons, but to cases separated or episodes of disease for which inpatient hospital treatment was provided during a given year, so that an individual person may be counted several times.

A composite index made up of several variables will include statistical series which are each qualified in some fashion peculiar to itself. A composite index made up of several statistical series is likely to compound the peculiarities or errors inherent in each component series. On the other hand, weaknesses in one series may sometimes be compensated by the strengths of other series, so that the composite index may be less inadequate than each component series.

The final difficulty in constructing a composite index is the fact that not all variables are equally important. This commonly results in a different weight being given to each series, with the only constraint being that the weights add up to unity.

The weights to be assigned to statistical series are sometimes

based on monetary values in terms of costs incurred by the individual or by the society. For instance, our society puts a great deal of value in human life, so that death is viewed as a very grave occurrence. This is reflected in the fact that surviving family members are allowed a period of mourning, as well as the payment of government death benefits, proceeds from private life insurance policies, etc. On the other hand, the cost to society in terms of lost productivity of a retired person 72 years of age, or of an unemployed and unemployable person aged 56 may be virtually nil, particularly when weighted against the cost of medical treatment. Some economists have argued ironically that death in such cases can be considered to represent a net benefit to society. The costing of human life is obviously a difficult problem which has been considered by economists for some time, but which has not yet been resolved. [13]

Similar problems arise when one tries to determine the relative weight of the remaining variables.

In cases where there is not enough information to assign different weights to the variables chosen, there are sound statistical reasons for adopting the practical rule that all retained variables are of the same high relative importance and that they be given the same weight. [14] That is in fact the only reasonable approach to use, particularly at this stage of development of the index of severity of alcohol and drug problems, and that is in fact what has been done in this analysis.

Data were analyzed for Ontario counties for the period 1978.

Absolute numbers were converted into rates per given population size to compensate for fluctuations in populations between counties (Table 5).

- Alcohol consumption was expressed in litres of absolute alcohol per person.
- All other variables (alcohol and drug offences, alcohol and drug hospital separations and liver cirrhosis deaths) were expressed as rates per 100,000 population.

Correlation of Statistical Series

One of the first questions one must ask oneself is if these six series are statistically related to one another. If they do in fact all vary in the same direction, so that a county with a high level of alcohol consumption will also have high levels of alcohol offences, morbidity and mortality, and drug offences and morbidity, then there is no point in combining these series together to get an overall sense of what is going on. One may as well substitute any one of these series for all the others.

Mäkelä [15] reviewed a number of studies of the relationship of various social aspects of alcohol consumption and its consequences and found no conclusive relationships. He felt this was due to the doubtful validity of the variables used in those studies, in particular to the use of variables for different years in the same study.

In this analysis, alcohol and drug statistical series used referred to the same year 1978.

The relationship of each of the six separate variables was considered one to one, using both Spearman (r_s) and Pearson (r) correlations. The use of both correlation coefficients was due to the fact that two methods were considered in constructing a composite index, one based on relative rank for which the Spearman rank correlation was taken into account, and one based on relative values of each variable for which the Pearson correlation was used.

In considering the Pearson correlations (r) between each of the six variables taken one to one (Table 6), out of 15 possible combinations of different variables, 10 showed a significant level of correlation ($p < 0.05$). Most of these correlations varied in the expected direction.

The alcohol indicators were generally positively correlated to one another. Alcohol consumption was positively correlated with alcohol offences ($r = 0.43$, $p = 0.002$) and alcohol morbidity ($r = 0.52$, $p = 0.0001$); and alcohol offences were positively associated with alcohol morbidity ($r = 0.63$, $p = 0.0001$).

The only jarring note was the negative correlation between alcohol offences and alcohol mortality ($r = -0.29$, $p = 0.04$). One hesitates to offer an explanation for this relationship, although it may be that death from liver cirrhosis may remove individuals from the pool of potential alcohol offenders. It is unlikely to be due to a reduction in the number of cirrhotic deaths due to the deterrent effect of being charged

with an alcohol offence, as cirrhotic deaths affect older persons whereas liquor offences affect persons of all ages, juveniles as well as adults. Only if the relationship held between 1978 deaths and alcohol offences of earlier years, would one be likely to seriously consider this possibility.

With regards to the drug indicators, they too vary in the expected direction: drug offences were positively correlated with drug morbidity ($r = 0.31$, $p = 0.03$).

The relationship between alcohol and drug indicators is an interesting one, for they are practically all positively correlated one with another: alcohol consumption is positively correlated to drug morbidity ($r = 0.35$, $p < 0.02$); alcohol offences are positively correlated with drug offences ($r = 0.47$, $p = 0.0007$), and with drug morbidity ($r = 0.39$, $p < 0.006$); alcohol morbidity is positively correlated with drug offences ($r = 0.30$, $p < 0.04$), and with drug morbidity ($r = 0.62$, $p = 0.0001$). There appears to be no substitution of drug- for alcohol-related problem behaviour. There does not appear to be evidence of a normative level of "being high" and its associated behaviours or a set level of demand for "being high", which individuals attempt to reach in a county, regardless of the means used to achieve this high, so that, if there is lack of availability or supply of a "drug high", there will be substitution of an "alcohol high", and vice versa.

In short, we do not appear to be faced with a "guns or butter"

or "alcohol or drugs" trade-off in a situation of limited resources. If there is a normative level of "being high" and its associated behaviour, the level appears to be set very high, so that both alcohol and drugs are used to reach it. On the other hand, the economic situation of Ontario may be such that Ontario residents can afford both alcohol and drugs.

Essentially, similar results were found with the Spearman rank correlation (r_s) as shown in Table 7.

- Alcohol consumption was positively correlated with alcohol offences ($r_s = 0.29$, $p < 0.05$) and with alcohol morbidity ($r_s = 0.63$, $p = 0.0001$); alcohol offences were positively associated with alcohol morbidity ($r_s = 0.30$, $p < 0.04$); and alcohol morbidity was positively correlated with alcohol mortality ($r_s = 0.36$, $p = 0.01$). Once more there was a negative correlation between alcohol offences and alcohol mortality ($r_s = -0.31$, $p = 0.03$).

The rank correlation of the drug indicators was not statistically significant, which is to be expected as the Spearman correlation is not as powerful a statistic as the Pearson.

The rank correlation between alcohol and drug indicators was again similar to what was found with the Pearson statistic:

- Alcohol consumption was positively correlated to drug morbidity ($r_s = 0.33$, $p = 0.02$); alcohol offences were positively correlated with drug offences at a borderline

level of significance (r_s = 0.26, p = 0.07); alcohol morbidity was positively correlated with drug morbidity (r_s = 0.47, p = 0.0006); and finally, alcohol mortality was positively correlated with drug morbidity (r_s = 0.39, p = 0.005).

Overall, as regards the correlation of the selected alcohol and drug indicators taken one to one, while there was significant correlation between them, the correlation was generally moderate.

When the alcohol and drug indicators were considered all together, they were found to be not particularly highly correlated one with another - Kendall's coefficient of concordance was only 0.32 (p = 0.00015), and it was therefore valid to consider combining these series together into a single composite index.

Construction of the Composite Index

In the construction of a composite index of the severity of alcohol and drug problem, two methods were considered:

1. The method of relative ranking, and
2. The method of index numbers.

Using these methods, it was possible to obtain the same comparative measure for a variety of variables and jurisdictions.

Ranks - In the method of relative ranking (Table 8), the 49

counties of Ontario were each assigned a rank from 1 to 49 for each of the six alcohol- and drug-related events, as well as a rank for all events combined. Ranking was done from lowest to highest, so that the county with the lowest per capita alcohol consumption was allotted rank number 1 for that variable, and the one with the highest per capita consumption was allotted rank number 49. Finally, a mean rank was calculated from the ranks for each variable, and the mean rank was ranked in its turn into an overall rank.

As one can clearly see, Rainy River with the highest overall rank, had the highest rank for drug offences and morbidity, and the second highest for alcohol offences and morbidity. Prince Edward, the county with the lowest overall rank, had the lowest rank for alcohol consumption and drug morbidity.

The relative ranking method gives equal weight to all variables and has the advantage of being relatively easy to calculate. It is easily understood by layman and professional alike. It has the disadvantage of being relatively insensitive to the degree of difference in actual values between ranks. The highest value for some variable may be twice as high as the next highest value of a variable (as can be seen in Figures 1 to 6), but no account is taken of that by this method.

Index Numbers - In the method of index numbers (Table 9), the provincial rate for each variable is given the value of 100, with the

county rates being calculated as decimal fractions relative to the provincial rate. Thus, for alcohol consumption, the provincial rate of 8.61 litres per capita of absolute alcohol is set equal to 100, with the Algoma rate of 9.89 litres per capita being equal to:

$$\frac{9.89 \text{ litres per capita}}{8.61 \text{ litres per capita}} \times 100 = 114.9 \text{ index points}$$

Index points are read in a fashion similar to the Consumer Price Index.

According to this method, per capita alcohol consumption rises to a high of 167 index points for Muskoka; in other words, the per capita consumption in Muskoka is 67% greater than the provincial average (167 - 100 = 67). Similarly, the per capita consumption of alcohol hits a low of 70.3 index points in Prince Edward County, which has a consumption 29.7% lower than the provincial average (100 - 70.3 = 29.7).

This sensitivity to the degree of difference in values of a variable is most dramatically shown for alcohol offences. Whereas the Hamilton-Wentworth alcohol offence index is 23.7, or over 75% less than the provincial average, the Kenora and Kenora (Patricia Portion) alcohol offence index is 471.3 index points. In other words, the Kenora rate of alcohol offences is 371.3% higher than the provincial rate.

As was done in the ranking method, it is possible to consider all variables together and to calculate a mean index for all the variables in each county. This forms the composite alcohol and drug index. As can be clearly seen, Prince Edward county had the lowest alcohol and drug

index value of 58.1 index points, being more than 40% below the provincial index number. The county with the highest composite alcohol and drug index number is Rainy River, with an index number of 292.1, or 192.1% higher than the provincial index number.

The index number method has the advantage of being sensitive to the degree of difference in the values of each variable, and insofar as it is similar to other well known indices such as the Consumer Price Index which is in common use today, it is likely to be easily understood by professionals and laymen alike. The results are also easily converted into percentages. However, it has the disadvantage of being more tedious to calculate, and as there is great variability in the values that index numbers can take (anywhere from 0.0 to a virtually limitless maximum in theory, but presently limited to 471.3 in this exercise, depending on the variable chosen), it may be more confusing to use when trying to quickly read which is the county with the worst problem. Each column of index numbers must be read carefully, if no mistakes are to be made. On the other hand, it is possible to quickly scan the columns of ranks to find which county has the highest or lowest rank.

The sensitivity of index numbers to the degree of difference in the values of variables, and particularly to very high values poses a problem in the case where one particular variable in a county may have a very high index number. The variable with a high index number tends to push up the value of the mean index, essentially giving greater importance to variables with high values.

How do the results obtained by the two different methods compare? We saw that there was agreement as to the county with the lowest problem, and the county with the highest problem. In addition, when a comparison was done of the ranking of counties obtained by relative ranking and by index numbers, the agreement was very close, the correlation coefficient being 0.95 ($p = 0.0001$).

The agreement is not perfect, because relative ranking depends on the rank, whereas, index numbers depend on the value of the variable.

Which method should be used? It depends on the usage intended. If one wants to present a quick overview, relative ranking can be quite effective being easy to calculate, present and understand. If one prefers to emphasize the amount of difference between counties, or even the relative importance of different variables, then the index method is preferred.

Maps - The index method actually has an advantage if one wants to present results in map form (Figure 7). To divide the counties of Ontario in terms of the severity of alcohol and drug problems, it is relatively easy to determine the range of variation, and to set boundary limits between categories. The Ontario index number is taken as the midpoint and all counties are classified in relation to it. Distinctions even finer than those between "above" and "below" the provincial rate can be made.

One may consider the following ranges of index points and corresponding classification of counties:

Index point range		County classification
0 - 79	=	low
80 - 99	=	below the provincial average
100 - 119	=	above the provincial average
120 - 199	=	high
200 and over	=	DANGER LEVEL

Obviously, these category boundaries are arbitrary, but no more arbitrary than the usual division into quartiles or some other percentile. In the case of our skewed distributions (Figure 8), it is possible that an upper or lower quartile may encompass the value of the provincial rate, and the usual comparisons of counties to the province will be obscured. The present method allows one to pinpoint areas where the problem is many times more severe than the provincial average, by setting the "Danger Zone" to encompass these areas where the local index is more than twice the provincial standard.

Socio-Economic Conditions

The indices of severity of alcohol and drug problems and their component indicators have so far been discussed in terms of their ability to describe the situation in a given area. They can also be used to try to explain why particular situations exist, or, failing the availability of a well integrated social theory of causality, they can be used to determine the nature and extent of the relationship of the

severity of alcohol and drug problems to underlying or concomitant socio-economic conditions. This means essentially that one needs quantified indicators of socio-economic well-being. Work on economic indicators has a long standing tradition, and economic indicators are numerous.

Three economic indicators, two income related and one related to buying patterns, were chosen for this study. They were:

I. per capita personal disposable income (DISINC 78) which includes the total income of residents of a given area after payment of direct taxes.[16] The average income of residents of a given area serves as a useful indicator of average purchasing power of individuals.

II. income per taxpayer (TAXINC 78) is calculated on the basis of individual tax returns, including both taxable and non-taxable returns, and serves a similar purpose to that of personal disposable income in identifying average purchasing power of taxpayers. However, as people do not necessarily spend their incomes in the areas in which they live, the high purchasing power of one area may translate into actual retail sales in another area. To measure effective buying power, one can use:

III. the per capita retail sales (RETAIL 78), which includes retail sales of food stores, motor vehicle dealers, service stations, clothing and shoe stores, hardware stores, and furniture, appliance, T.V. and radio stores.

Per capita retail sales for a given area indicate the extent to which an area attracts buyers from other areas and serves to identify dominant retail trading centres.

In addition, four proxy measures of social conditions, for which direct county-by-county measures were not available, were chosen. The social conditions examined included:

IV. employment (TAXRET 78) measured as the rate of tax filing income earners per population,

V. industrialization (MANEMP 77) measured as the rate of persons employed in manufacturing industries per population,

VI. urban concentration (URBRUR 77) measured as the rate of manufacturing payroll income relative to farm cash income, and

VII. average size of household (NOHOUS 78) measured as the rate of persons relative to households.

All socio-economic series (Table 10) were based on compilations prepared by The Financial Post Survey of Markets on the basis of data available from Statistics Canada.[17, 18] Data for 1978 were used throughout, except for industrialization and urban concentration for which 1977 was the latest year for which data were available.

A recent review of previous studies found a significant relationship between income and alcohol or drug use, although the direction

of the relationship has not always been consistent. Whereas, most authors agree that alcohol consumption increases as the real unit price of alcohol declines,[19] the relationship is not so clear-cut between alcohol consumption and income. Some report a higher percentage of alcohol use with higher income,[20] whereas, others report alcohol abusers to have a lower personal income,[21] and some report increased use of certain types of alcoholic beverage with increased[22, 23] or with decreased[24] income.

In our study (Table 11), there was no significant relationship between per capita alcohol consumption and per capita disposable income, although there was a negative correlation with per taxpayer income of borderline significance ($r_s = -0.24$, $p = 0.09$), and a positive correlation with per capita retail sales ($r_s = 0.399$, $p = 0.0045$). Whereas, this may mean that the poor buy relatively more alcohol, it may also mean the consumer is buying alcohol in the same county where he makes his other purchases, a county which differs from the county where he resides. This may be a reflection of positioning of major retail centres outside of residential areas, regardless of county boundaries which separate them.

Whereas, other studies had reported higher alcohol consumption during unemployment,[25] with drinking problems highest among the unemployed,[26] in the current study there was no significant relationship between the rate of employment and alcohol consumption, or with any other alcohol or drug indicator.

Industrialization was negatively correlated with alcohol consumption (r_s = -0.43, p = 0.002), which may again mean that the consumer is buying alcohol in a county other than the one where he is employed in a manufacturing industry. This may simply reflect the spacing of alcohol retail sales outlets relative to manufacturing industries.

Finally, as was found in earlier studies,[27] alcohol consumption was positively correlated with urban concentration (r_s = 0.38, p = 0.007), which may be due either to the availability of retail outlets in urban areas, or to the higher income in urban areas.

Alcohol morbidity was negatively correlated with disposable income (r_s = -0.32, p < 0.03) and with taxpayer income (r_s = -0.37, p = 0.008). This relationship is not due to the spacing of hospitals relative to residence since hospital statistics are reported on the basis of place of residence of the patient rather than location of hospital. The negative correlation between morbidity and income may be due to the affluent seeking medical treatment for their alcohol-related problems outside the inpatient hospital milieu, preferring treatment in a doctor's office, or on a hospital outpatient basis, or even outside the Ontario hospital context. On the other hand, a person with a high income may not yet be sufficiently physically deteriorated from alcohol and drug abuse to require hospital-based inpatient treatment. The more severely ill who are treated in hospital may represent those who are no longer able to continue being gainfully employed and who would therefore have a lower income.

Alcohol morbidity was also negatively correlated with industrialization (r_s = -0.44, p = 0.0015), but this may reflect the relatively higher wages obtained in manufacturing industries relative to other areas of employment, and a similar argument may apply as for income above.

An earlier study[28] indicated that alcohol arrests were higher in areas where income was higher. In this study alcohol offences were negatively correlated with disposable income (r_s = -0.43, p = 0.002) and taxpayer income (r_s = -0.40, p = 0.005). This may reflect the fact that alcohol offences are more likely to come to the attention of enforcement authorities outside a person's residence, and that such offenders as intoxicated drivers are most likely to be apprehended when they have long distances to drive home from the party or tavern where alcohol consumption occurred, and driving distances are more likely to be longer when county lines are crossed. Some would interpret this finding to be due to the reluctance of enforcement personnel to actively pursue rich offenders, and to concentrate instead on visible poor offenders, but such systematic police bias against the poor would not explain why drug offences are positively correlated to income (see below).

Alcohol offences were also negatively correlated with industrialization (r_s = -0.28, p < 0.05) which may again reflect the spacing of factories, residence and place of drinking, as well as the effect of higher wages in manufacturing industries.

Surprisingly enough, alcohol offences are also negatively correlated with urban concentration ($r_s = -0.28$, $p < 0.05$). There appears to be more alcohol offences detected in rural areas. Lengthy rural driving distances may increase the likelihood of apprehension for traffic offences, and the lack of sufficient outlets for retail or on-premise sales to meet demand in rural areas may result in liquor act offences as the local population attempts to illegally increase access to alcoholic beverages. Some would interpret the finding as due to the concentration of rural authorities in enforcing alcohol over other regulations, but there may simply be few alternative local activities other than drinking and few opportunities of committing non-alcohol-related offences.

No significant relationship was found between alcohol mortality or drug morbidity and any of the socio-economic variables.

In the case of drug offences, our findings were the opposite of those for alcohol offences. Whereas, alcohol offences were negatively correlated to the socio-economic variables, drug offences were positively correlated with all of them. Drug offences were positively correlated with disposable income ($r_s = 0.44$, $p < 0.002$), with taxpayer income ($r_s = 0.36$, $p = 0.01$), with industrialization ($r_s = 0.24$, $p = 0.09$ borderline significance). These findings may result from the nature of drug offences: that is the possession or use of defined drugs is illegal, and such drugs may be habitually stored or used in the home of the

individual, or even in the place of employment. The substances might also be more available, or more likely to be used by persons with higher incomes either because of the costliness of the substances, or of the tendency of high income people to be more open to non-traditional, daring or trendy behaviour.

Drug offences are also positively associated with urban concentration ($r_s = 0.40$, $p = 0.004$), due to the fact that the enforcement of drug laws may be more stringent and assiduous in urban areas, or the availability of drugs may be greater in urban areas.

Conclusion

The selection of alcohol and drug indicator statistical series for purposes of producing effective public education tools was discussed. The construction of a composite index of severity of the social burden of alcohol and drug problems using two methods, one based on relative ranks, and one based on index numbers was considered. This latter method was used to produce a map showing the relative burden of alcohol and drug problems for counties of Ontario in 1978, allowing the identification of counties with dangerously high problem levels, equal to more than twice the provincial average.

The relationship of six alcohol- and drug-related indicator statistical series, i.e., alcohol consumption, alcohol offences, alcohol morbidity, alcohol mortality, drug offences and drug morbidity, was examined. The correlation of each statistical series taken one to one

was significantly positively associated, varying from a high of $r = 0.63$ ($p = 0.0001$) to a low of $r = 0.30$ ($p = 0.036$) depending on the series selected, with the only exception to this positive relationship being the negative correlation of alcohol offences to alcohol mortality ($r = -0.29$, $p = 0.044$). The coefficient of concordance of all drug and alcohol statistical series considered all together did not exceed a value of 0.32 ($p = 0.00015$).

Also examined were the nature and extent of the relationship of these alcohol and drug indicators to underlying Ontario economic and social conditions, consisting of disposable income, per taxpayer income, retail sales, employment, industrialization, urban concentration and average household size. For most alcohol-related behaviour, statistically significant negative correlations were found with the socio-economic indicators, i.e., consumption negatively correlated with industrialization, offences negatively correlated with industrialization, urban concentration, disposable income and per taxpayer income, and morbidity negatively correlated with industrialization, disposable income and per taxpayer income; the only exception to this trend was the positive correlation of alcohol consumption with urbanization and retail sales. In the case of drug-related behaviour, all statistically significant associations with the socio-economic indicators were positive, i.e., drug offences were positively correlated with industrialization, urbanization, disposable income and per taxpayer income.

While there does not appear to be a general substitution of

a drug "high" for an alcohol "high", the opposing findings for alcohol and drug offences may indicate that for specific income groups, for higher income persons, living in industrialized or urban areas, there may be substitutability of drugs for alcohol, and this may lead one to wonder if current development trends towards increased industrialization, urban growth and rising incomes will also bring about increased drug problems in Ontario.

This has been an attempt to illustrate how one can go about presenting informative data in understandable form to better serve the purposes of research, policy analysis, and program development and evaluation. The results of this study can be used as focal points for public discussions of the problems of alcohol and drugs. The approach used to measure the severity of alcohol and drug problems is still in its infancy and more research should be done, particularly on the problems of differential weighting of variables, as well as on the effects of errors inherent in indicator statistical series. It is hoped the methods and results presented here can be further refined to serve as a tool in research into the causes and circumstances surrounding the trends in the development of alcohol and drug problems.

FOOTNOTES

[1] Organization for Economic Co-operation and Development, Measuring Social Well-Being: A Progress Report on the Development of Social Indicators. The OECD Social Indicator Development Programme, No. 3, Paris, 1976.

[2] D. F. Johnston, Basic Disaggregations of Main Social Indicators. The OECD Social Indicator Development Programme, Special Studies No. 4, Organization for Economic Co-operation and Development, Paris, 1977, p. 10.

[3] United Nations, Social Indicators: Preliminary Guidelines and Illustrative Series, Department of International Economic and Social Affairs, Statistical Office, Statistical Papers, Series M, No. 63, N.Y., 1978 (ST/ESA/STAT/SER.M/63), p. 3.

[4] United Nations, Towards a System of Social and Demographic Statistics, Department of Economic and Social Affairs, Statistical Office, Studies in Methods, Series F, No. 18, N.Y., 1975 (ST/ESA/STAT/SER.F/18), p. 27.

[5] S. Fanchette, "Social Indicators: Problems of Methodology and Selection," in Part I of Social Indicators: Problems of Definition and of Selection, UNESCO, Methods and Analysis Division, Department of Social Sciences, Reports and Papers in the Social Sciences, No. 30, Paris, 1974, p. 9.

[6] M. Adrian, The "Whys and Wherefores" of Information Systems: Nature and Magnitude of Alcohol Situation in Ontario, Alcoholism and Drug Research Foundation, Substudy No. 1123, Toronto, 1980, p. 2.

[7] M. Adrian, 1980, op. cit, Table I.

[8] United Nations, 1978, op. cit.

[9] United Nations, 1978, op. cit, p. 24.

[10] Z. Hellwig, "A Method for the Selection of a 'Compact' Set of Variables," in Part II of Social Indicators: Problems of Definition and of Selection, UNESCO, Methods and Analysis Division, Department of Social Sciences, Reports and Papers in the Social Sciences, No. 30, Paris, 1974, p. 11.

[11] United Nations, 1978, op. cit, p. 24.

[12] Alcoholism and Drug Addiction Research Foundation, Statistical Supplement to the Annual Report 1978-79, Toronto, 1980, pp. 3 - 5.

[13] E. J. Mishan, Cost Benefit Analysis: An Informal Introduction, George Allen I. Unwin Ltd., London, 1971, pp. 153 - 174.

[14] Z. Hellwig, op. cit, p. 14.

[15] K. Mäkelä, "Level of Consumption and Social Consequences of Drinking," in Research Advances in Alcohol and Drug Problems, Vol. 4, ed. Y. Israel et al., Plenum Press, N.Y., 1978, pp. 303 - 348.

[16] Personal disposable income includes:

a) non-farm earned income (wages and salaries and income from unincorporated business enterprises);

b) net income from farming operations;

c) wages of hired farm labour;

d) personal income from investments;

e) transfer payments from governments to persons (family allowances, old age pensions, etc.);

f) small miscellaneous components of personal income.

From the sum of the above, are subtracted:

g) personal direct taxes.

[17] Maclean-Hunter Limited, The Financial Post Survey of Markets 1977/78 and 1979, 53rd and 54th ed., Toronto, 1977 and 1978 respectively.

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[19] N. Giesbrecht, "Appendix A - Notes on Alcohol Control Measures, Consumption Levels, and Alcohol Problems," in Alcohol Consumption, Alcohol Problems and Economic Development in Northern Ontario, Alcoholism and Drug Addiction Research Foundation, Substudy No. 945, Toronto, 1978, pp. A-1 to A-12.

[20] R. G. Smart, M. S. Goodstadt, Alcohol and Drug Use Among Ontario Adults: Report of a Household Survey, 1977, Alcoholism and Drug Addiction Research Foundation, Substudy No. 957, Toronto, 1978.

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[25] C. B. Liban, R. G. Smart, 1979, op. cit.

[26] R. G. Smart, Drinking Problems among Employed, Unemployed and Shift Workers, Alcoholism and Drug Addiction Research Foundation, Substudy No. 1047, Toronto, 1979.

[27] N. Giesbrecht, 1978, op. cit.

[28] P. G. Donnelly, "Alcohol Problems and Sales in the Counties of Pennsylvania - A Social Area Investigation," Journal of Studies on Alcohol, Vol. 39, No. 5, 1978, pp. 848 - 858.

TABLE 1: ALCOHOL-AND DRUG-RELATED ONTARIO STATISTICS BY COUNTY, 1978

County	Alcohol-Related				Drug-Related	
	Absolute Alcohol Consumption [1] (litres)	Alcohol Offences [2]	Hospital Separations [3]	Liver Cirrhosis Deaths [4]	Drug Offences [2]	Hospital Separations [3]
Algoma	1,259,067	1,793	353	16	267	4
Brant	809,051	1,018	249	21	89	15
Bruce	618,839	1,685	234	13	94	8
Cochrane	912,937	2,219	715	16	224	11
Dufferin	223,076	565	59	3	8	4
Dundas-Glengarry-Stormont	779,954	1,484	250	14	142	7
Durham	2,018,767	6,771	375	15	1,052	13
Elgin	479,330	2,090	111	7	84	5
Essex	2,665,037	2,812	468	47	752	55
Frontenac	1,048,015	2,796	231	11	99	16
Grey	602,835	2,603	240	11	136	5
Haldimand-Norfolk	731,403	2,617	157	11	194	6
Haliburton	145,681	299	30	3	5	2
Halton	1,809,536	3,795	404	30	594	16
Hamilton-Wentworth	3,536,964	1,821	533	53	1,923	39
Hastings	1,056,358	1,977	305	18	142	18
Huron	419,763	1,588	137	3	42	3
Kenora & Kenora P.P.	782,197	5,090	405	3	174	14
Kent	928,848	3,255	215	9	261	15
Lambton	1,042,732	4,240	249	12	495	10
Lanark	425,866	1,201	113	1	60	1
Leeds-Grenville	695,811	2,748	115	10	172	1
Lennox & Addington	244,281	1,397	34	1	71	1
Manitoulin	126,870	586	74	1	18	2
Middlesex	2,672,054	5,882	417	24	531	14
Muskoka	543,851	1,430	68	1	86	0
Niagara	3,130,398	4,257	738	56	275	40
Nipissing	785,219	1,973	200	15	262	5
Northumberland	520,171	1,492	134	7	110	4
Ottawa-Carleton	4,550,729	5,002	907	66	705	55
Oxford	570,227	3,298	129	8	180	1
Parry Sound	385,831	841	88	1	50	2
Peel	3,221,836	5,224	510	35	1,223	16
Perth	530,055	1,852	135	9	155	5
Peterborough	996,117	1,503	208	15	119	15
Prescott & Russell	371,833	372	84	5	39	2
Prince Edward	131,590	555	33	1	11	0
Rainy River	255,371	1,977	180	2	208	8
Renfrew	905,852	1,496	267	14	63	7
Simcoe	2,197,391	6,771	382	29	667	14
Sudbury (R.M.)	1,559,319	2,100	263	12	416	12
Sudbury (T.D.)	283,450	1,057	134	4	53	3
Thunder Bay	1,688,902	3,777	620	20	431	18
Timiskaming	386,955	545	124	12	43	2
Toronto Metro	18,247,520	37,486	3,292	295	5,668	199
Victoria	439,978	1,601	80	2	111	1
Waterloo	2,543,669	3,513	348	29	474	17
Wellington	971,344	2,133	325	11	211	28
York	1,445,087	3,581	245	18	402	16
All Ontario	72,697,967	156,168	15,967	1,020	19,591	755

FOOTNOTES FOR TABLE 1

[1] Provincial totals are obtained by summing individual county data. Counties refer to store location which would in most cases correspond to counties of residence of purchasers. Consumption figures are based on sales data reported by the Liquor Control Board of Ontario (LCBO) converted into absolute alcohol on the basis of percentage alcohol content for each beverage, with estimated absolute alcohol conversion factors applied to a few products for which exact figures were unavailable. Figures include sales data from LCBO outlets for spirits and wine, and from Brewers Retail for beer. Independent wine store sales were estimated.

[2] Data are based on the Uniform Crime Reporting (UCR) system for events occurring in Ontario based on reports from all police forces policing Ontario (including police forces headquartered outside Ontario). All cases reported or known to the police in both urban and rural areas are included. Number refers to offences not persons as an individual is counted on each separate occasion s/he is involved in an offence known or reported to the police. In cases involving multiple offences, only the most serious offence is recorded. In Metro Toronto all offences are counted, resulting in figures which may be inflated relative to the rest of the province. Data in the UCR system are constantly updated and tardy reports are included.

[3] Separations refer to "cases separated" during the year and not to actual number of "persons" involved, as an individual is counted on each separate occasion that s/he stays in hospital. Cases treated in hospital on an inpatient basis, for the medically established conditions when diagnoses specified were noted as primary diagnosis are included. Cases treated on a hospital outpatient basis, through office based physician services, non-hospital based residential facilities, social agencies or counselling services are excluded.

[4] Includes only those deaths where liver cirrhosis was noted as the primary cause of death.

Note: R.M. - Regional Municipality
T.D. - Territorial District
P.P. - Patricia Portion

Sources: B. Rush, S. Macdonald and N. Giesbrecht, Estimating the Number of Alcoholics in Ontario: An Analysis by County (Toronto: ARF Substudy No. 1163, 1981); Statistics Canada, Alcohol- and Drug-Related Offences - Ontario Reporting Units in 1978 (Ottawa: Statistics Canada, Justice Statistics Division - special computer printout 1980); P. M. Jull, Alcohol-Related Morbidity for Regions of Ontario 1972 to 1978 (Toronto: ARF Substudy No. 1149, 1980); Registrar General, Province of Ontario, Vital Statistics for 1975, 1976, 1977 and 1978 (Toronto, undated); Unedited hospital morbidity tapes. Data supplied by Statistics Canada, Hospital Morbidity Section (Ottawa, 1980).

TABLE 2

ALCOHOL AND ITS POSSIBLE EFFECTS ON THE USER

Initial Behaviour	Effects	Outcome
Alcohol Consumption	Immediate / Deferred Short term / Long term Individual / Personal Acute / Chronic - Physiological - Psychological Social / Environmental Transient / Permanent - Family - Friends - Work - Material well-being - Financial security	Total recovery Recovery with reduced: - Physical function - Mental function - Social function Recovery with reduced: - Life expectancy Death

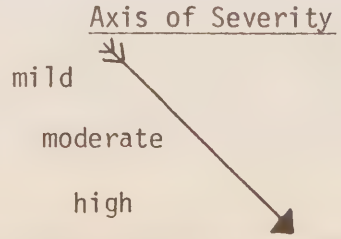

TABLE 3: STATISTICS ON ALCOHOL CONSUMPTION AND ITS EFFECTS, ONTARIO, (YEAR)

A. INITIAL BEHAVIOUR

Alcohol Consumption

- % consuming
  - 85% of those 18 years + (1978)
- Amount consumed
  - 2.5 gal. per capita of those 15 + (1977-78)
- Frequency
  - once a week for 50% of those 18 + (1978)

B. EFFECTS

1. Legal
   - liquor act violations
     - 97,530 adults and juveniles, (1977)
   - inebriation
   - public drunkenness
   - bar brawls
   - other crime
     - 1,498 murders, (1961-74, Canada)
   - traffic offences
     - driving while impaired, 80 mg., refused breathtest
     - persons, 44,415, (1977)
   - traffic accidents
     - impaired drivers, 29,298, (1976)
     - impaired pedestrians, 456, (1976)

B. EFFECTS (Legal, continued)

- snowmobile
  - collisions, impaired drivers, 167, (1978-79)

2. Medical
   - alcoholics, 236,000 persons (1976)
   - general hospital - hospital inpatient
     - alcoholic psychosis, 773, (1975)
     - alcoholism, 11,994 (1975)
     - liver cirrhosis, 4,768 (1975)
   - mental hospital - first admission
     - alcoholic psychosis, 237, (1976)
     - alcoholism, 3,593 (1976)
   - mental hospital - readmission
     - alcoholic psychosis, 267 (1976)
     - alcoholism, 3,180 (1976)
   - hospital outpatient
     - visits, 17,415, Clinical Institute (1978-79) includes 8,426, possibly methadone related
   - nonhospital resident
     - cases, 30,974 (A. E. Reid, 1975-76)
   - physicians' offices

3. Social / Environment
   - family problems 760 murders, (Canada, 1961-74)
     - spouse
     - children
       - 92 children, wards of training school for alcohol offences, (1979)

TABLE 3 (continued)

B. EFFECTS (Social / Environment, continued)

- estimated 330,000 children of parents with alcohol problems (1975)
- parents
- other relatives
- quarrels
- physical abuse
  - estimated 10% all accidents (1971)
- assault and battery
- mental breakdown
- marriage breakdown
  - separation
  - divorce
- abandonment of children, foster homes
- counselling
  - family
  - marital
  - Alcoholics Anonymous

4. Work

- tardiness
- absenteeism
  - estimated 4,000 workers, (1977)
- lower productivity
  - estimated $124.3 M. (1971), or $250 M. today [$75 M. manufacturing, (1977)]
- increased job accidents
  - estimated 10% of all accidents (1971)

B. EFFECTS (Work, continued)

- poor relations in work environment
  - co-workers
  - subordinate
  - supervisor
  - public
- loss of employment
- salary loss
  - estimated $86.5 M. (1971) or $175 M. today

5. Financial problems

- financial assistance
  - Unemployment Insurance Commission
  - Old Age Security Pension
  - Mothers Allowance
  - Invalid Pension
  - Workmens Compensation Board - estimated $40 M. (1978)

C. OUTCOME

1. Total Recovery

2. Partial Recovery with Reduced:
   - physical function
   - mental function
   - social function

3. Recovery with Reduced Life Expectancies
   - potential years of life lost

TABLE 3 (continued)

C. OUTCOME (Recovery with Reduced Life Expectancies, continued)		
- liver cirrhosis	13,635.0	1976
- alcoholic psychosis	200.5	1976
- alcoholism	3,827.5	1976
- accidents involving alcohol	3,356.0	1976
Total	21,019.0	
4. Death		
- alcoholic psychosis	20	1977
- alcoholism	236	1977
- liver cirrhosis	1,051	1977
- accidental poisoning from alcohol	19	1977
- adverse or toxic effects from alcohol alone or in combination	140	1977
- traffic fatalities		
- drivers	512	1976
- pedestrians	51	1976
- snowmobile collisions	12	1978-79
- murder (Canada)	1,498	1961-74

Source: Addiction Research Foundation Annual Report 1977-78 and 1978-79, as well as additional documentation from Statistical Information Section, Research Division, Addiction Research Foundation, Toronto, Ontario.

TABLE 4: ALCOHOL- AND DRUG-RELATED PROBLEMS: CHARACTERISTICS OF STATISTICAL SERIES, ONTARIO, 1978

Variables	Data Source + *Special Remarks	County
Alcohol Consumption (ALCONS)	LCBO sales data (spirits, wine, beer) Brewers retail sales data (beer) *Estimated independent wine store sales	of location of store
Alcohol Offences (ALCOFF)	Uniform Crime Reporting System (UCR-Statistics Canada) *includes Liquor Act infractions, impaired driving, refusing breath sample *all offences known/reported in Metro Toronto *most serious offence outside Metro Toronto *offences not persons	of occurrence of offences
Alcohol Morbidity (ALCMORB)	Hospital Morbidity (Statistics Canada) *primary diagnosis only *includes alcoholism, alcoholic psychosis, liver cirrhosis *inpatient treatment of *cases not persons	of residence of case
Alcohol Mortality (ALCMORT)	Vital Statistics of Ontario (Registrar General) *primary cause of death for *liver cirrhosis	of residence of deceased
Drug Offences (DRG_OFFE)	UCR-Statistics Canada *offences under Narcotic Control Act *as for Alcohol Offences above	of occurrence of offences
Drug Morbidity (DRG_MORB)	Hospital Morbidity (Statistics Canada) *includes drug dependence *as for Alcohol Morbidity above	of residence of case

TABLE 5: RATES OF ALCOHOL AND DRUG PROBLEMS, ONTARIO, 1978

COUNTY	ALCONS	ALCOFF	ALCMORB	ALCMORT	DRG_OFFE	DRG_MORB
ALGOMA	9.89	1403.00	277.39	12.6	209.8	3.14
BRANT	7.96	1001.60	244.99	20.7	67.6	14.76
BRUCE	10.45	2844.90	395.08	21.9	158.7	13.51
COCHRANE	9.58	2329.30	750.56	16.8	235.1	11.55
DUFFERIN	7.08	1794.40	187.38	9.5	25.4	12.70
DUNDAS-GLENGARRY-STORMONT	7.76	1476.60	248.75	13.9	141.3	6.97
DURHAM	7.62	2554.40	141.47	5.7	396.5	4.90
ELGIN	6.94	3027.00	160.76	10.1	121.7	7.24
ESSEX	8.42	888.80	147.93	14.9	237.7	17.39
FRONTENAC	9.20	2453.90	202.74	9.7	86.9	14.04
GREY	8.33	3597.00	331.65	15.2	187.9	6.91
HALDIMAND - NORFOLK	8.15	2916.10	174.95	12.3	216.2	6.69
HALIBURTON	14.28	2930.80	294.06	29.4	49.0	19.60
HALTON	7.51	1574.00	167.57	12.4	246.4	6.64
HAMILTON-WENTWORTH	8.52	438.90	128.45	12.8	463.5	9.40
HASTINGS	9.99	1869.70	288.45	17.0	134.3	17.02
HURON	7.59	2870.70	247.66	5.4	75.9	5.42
KENORA AND KENORA P.P.	13.40	8717.39	693.63	5.1	298.0	23.93
KENT	8.70	3048.30	201.34	8.4	244.4	14.05
LAMBTON	8.47	3445.90	202.37	9.8	402.3	8.13
LANARK	9.50	2678.80	252.04	2.2	133.8	2.23
LEEDS -GRENVILLE	8.71	3438.90	143.92	12.5	215.2	1.25
LENNOX AND ADDINGTON	7.48	4276.10	104.07	3.1	217.3	3.06
MANITOULIN	11.60	5358.39	676.66	9.1	164.6	18.29
MIDDLESEX	8.42	1853.40	131.39	7.6	167.3	4.41
MUSKOKA	14.38	3782.20	179.84	2.6	227.5	0.00
NIAGARA	8.53	1159.40	200.99	15.3	74.9	10.89
NIPISSING	9.86	2477.20	251.11	18.8	329.0	6.28
NORTHUMBERLAND	7.91	2268.20	203.71	10.6	167.2	6.08
OTTAWA - CARLETON	8.53	937.90	170.07	12.4	132.2	10.31
OXFORD	6.73	3891.00	152.19	9.4	212.4	1.18
PARRY SOUND	12.18	2655.00	277.82	3.2	157.8	6.31
PEEL	7.64	1238.90	120.95	8.3	290.0	3.79
PERTH	6.00	2796.10	203.83	13.6	234.0	7.55
PETERBOROUGH	10.01	1510.90	209.10	15.1	119.6	15.08
PRESCOTT AND RUSSELL	7.32	732.70	165.45	9.8	76.9	3.94
PRINCE EDWARD	6.05	2553.70	151.84	4.6	50.6	0.00
RAINY RIVER	10.47	8107.10	738.13	8.2	852.9	32.81
RENFREW	10.30	1700.60	303.51	15.9	71.6	7.96
SIMCOE	9.97	3072.50	173.34	13.2	302.7	6.35
SUDBURY (R.M.)	9.56	1287.00	161.13	7.4	255.0	7.35
SUDBURY (T.D.)	10.76	4012.70	508.72	15.2	201.2	11.39
THUNDER BAY	11.24	2513.50	412.60	13.3	286.8	11.98
TIMISKAMING	9.29	1308.80	297.77	28.8	103.3	4.80
TORONTO METRO	8.57	1760.60	154.61	13.9	266.2	9.35
VICTORIA	9.71	3534.40	176.61	4.4	249.0	2.21
WATERLOO	8.38	1157.50	114.66	9.6	156.2	5.60
WELLINGTON	7.40	1624.70	247.55	8.4	180.7	21.33
YORK	6.65	1648.60	112.79	8.3	135.1	7.37
ALL ONTARIO	8.61	1849.50	189.10	12.1	232.0	8.94

TABLE 6: PEARSON CORRELATIONS OF ALCOHOL AND DRUG INDICATORS, ONTARIO, 1978

ALCOHOL CONSUMPTION, ALCOHOL OFFENCES, ALCOHOL MORBIDITY,
ALCOHOL MORTALITY, DRUG-RELATED OFFENCES, DRUG MORBIDITY

PEARSON CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 49

	ALCONS	ALCOFF	ALCMORB	ALCMORT	DRG_OFFE	DRG_MORB
ALCONS		0.42729 0.0022	0.52260 0.0001			0.34558 0.0150
ALCOFF			0.62909 0.0001	-0.28874 0.0442	0.46750 0.0007	0.38788 0.0059
ALCMORB					0.30023 0.0361	0.61796 0.0001
ALCMORT						0.25392 0.0783
DRG_OFFE						0.30854 0.0310
DRG_MORB						

TABLE 7: SPEARMAN CORRELATIONS OF ALCOHOL AND DRUG INDICATORS, ONTARIO, 1978

ALCOHOL CONSUMPTION, ALCOHOL OFFENCES, ALCOHOL MORBIDITY,
ALCOHOL MORTALITY, DRUG-RELATED OFFENCES, DRUG MORBIDITY

SPEARMAN CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 49

	ALCONS	ALCOFF	ALCMORB	ALCMORT	DRG_OFFE	DRG_MORB
ALCONS		0.28685 0.0457	0.62743 0.0001			0.32839 0.0212
ALCOFF			0.29929 0.0367	-0.30663 0.0321	0.25878 0.0726	
ALCMORB				0.36138 0.0107		0.47414 0.0006
ALCMORT						0.39476 0.0050
DRG_OFFE						
DRG_MORB						

TABLE 8: RANKING OF SEVERITY OF ALCOHOL AND DRUG PROBLEMS, ONTARIO, 1978

(1 = lowest, 49 = highest)

COUNTY	ALCONS	ALCOFF	ALCMORB	ALCMORT	DRG_OFFE	DRG_MORB	MEAN RANK	RANK OF MEAN RANK
ALGOMA	36.0	11	36	30.0	27	8.0	24.6667	27.0
BRANT	15.0	5	30	46.0	9	41.0	24.3333	24.0
BRUCE	41.0	32	43	47.0	19	38.0	36.6667	44.0
COCHRANE	33.0	23	49	43.0	34	35.0	36.1667	42.0
DUFFERIN	5.0	19	22	19.0	1	37.0	17.1667	8.5
DUNDAS-GLENGARRY-STORMONT	13.0	12	33	35.5	16	23.0	22.0833	18.0
DURHAM	11.0	28	7	9.0	46	13.0	19.0000	12.0
ELGIN	4.0	36	13	24.0	12	24.0	18.8333	11.0
ESSEX	20.5	3	9	37.0	35	44.0	24.7500	28.5
FRONTENAC	29.0	24	26	21.0	8	39.0	24.5000	25.5
GREY	18.0	42	42	39.5	25	22.0	31.4167	39.0
HALDIMAND - NORFOLK	17.0	34	19	26.0	30	21.0	24.5000	25.5
HALIBURTON	48.0	35	39	49.0	2	46.0	36.5000	43.0
HALTON	9.0	14	16	27.5	38	20.0	20.7500	15.0
HAMILTON-WENTWORTH	23.0	1	5	31.0	48	31.0	23.1667	22.0
HASTINGS	38.0	21	38	44.0	15	43.0	33.1667	40.0
HURON	10.0	33	32	8.0	6	14.0	17.1667	8.5
KENORA AND KENORA P.P.	47.0	49	47	7.0	43	48.0	40.1667	48.0
KENT	27.0	37	24	15.5	36	40.0	29.9167	36.0
LAMBTON	22.0	40	25	22.5	47	29.0	30.9167	37.0
LANARK	31.0	30	35	1.0	14	6.0	19.5000	13.0
LEEDS -GRENVILLE	26.0	39	8	29.0	29	4.0	22.8333	21.0
LENNOX AND ADDINGTON	8.0	46	1	3.0	31	7.0	16.0000	7.0
MANITOULIN	45.0	47	46	17.0	21	45.0	36.8333	45.0
MIDDLESEX	20.5	20	6	11.0	23	11.0	15.2500	6.0
MUSKOKA	49.0	43	21	2.0	32	1.5	24.7500	28.5
NIAGARA	24.5	7	23	41.0	5	33.0	22.2500	19.0
NIPISSING	35.0	25	34	45.0	45	17.0	33.5000	41.0
NORTHUMBERLAND	14.0	22	27	25.0	22	16.0	21.0000	16.0
OTTAWA - CARLETON	24.5	4	17	27.5	13	32.0	19.6667	14.0
OXFORD	3.0	44	11	16.0	28	3.0	17.8333	10.0
PARRY SOUND	46.0	29	37	4.0	18	18.0	25.3333	31.0
PEEL	12.0	8	4	13.5	42	9.0	14.7500	5.0
PERTH	16.0	31	28	34.0	33	27.0	28.1667	33.0
PETERBOROUGH	39.0	13	29	38.0	11	42.0	28.6667	34.5
PRESCOTT AND RUSSELL	6.0	2	15	22.5	7	10.0	10.4167	2.0
PRINCE EDWARD	1.0	27	10	6.0	3	1.5	8.0833	1.0
RAINY RIVER	42.0	48	48	12.0	49	49.0	41.3333	49.0
RENFREW	40.0	17	41	42.0	4	28.0	28.6667	34.5
SIMCOE	37.0	38	18	32.0	44	19.0	31.3333	38.0
SUDBURY (R.M.)	32.0	9	14	10.0	39	25.0	21.5000	17.0
SUDBURY (T.D.)	43.0	45	45	39.5	26	34.0	38.7500	47.0
THUNDER BAY	44.0	26	44	33.0	41	36.0	37.3333	46.0
TIMISKAMING	30.0	10	40	48.0	10	12.0	25.0000	30.0
TORONTO METRO	26.0	18	12	35.5	40	30.0	26.9167	32.0
VICTORIA	34.0	41	20	5.0	37	5.0	23.6667	23.0
WATERLOO	19.0	6	3	20.0	17	15.0	13.3333	3.0
WELLINGTON	7.0	15	31	15.5	20	47.0	22.5833	20.0
YORK	2.0	16	2	13.5	24	26.0	13.9167	4.0

Figure 1

RATES OF ALCOHOL CONSUMPTION
ONTARIO COUNTIES 1978

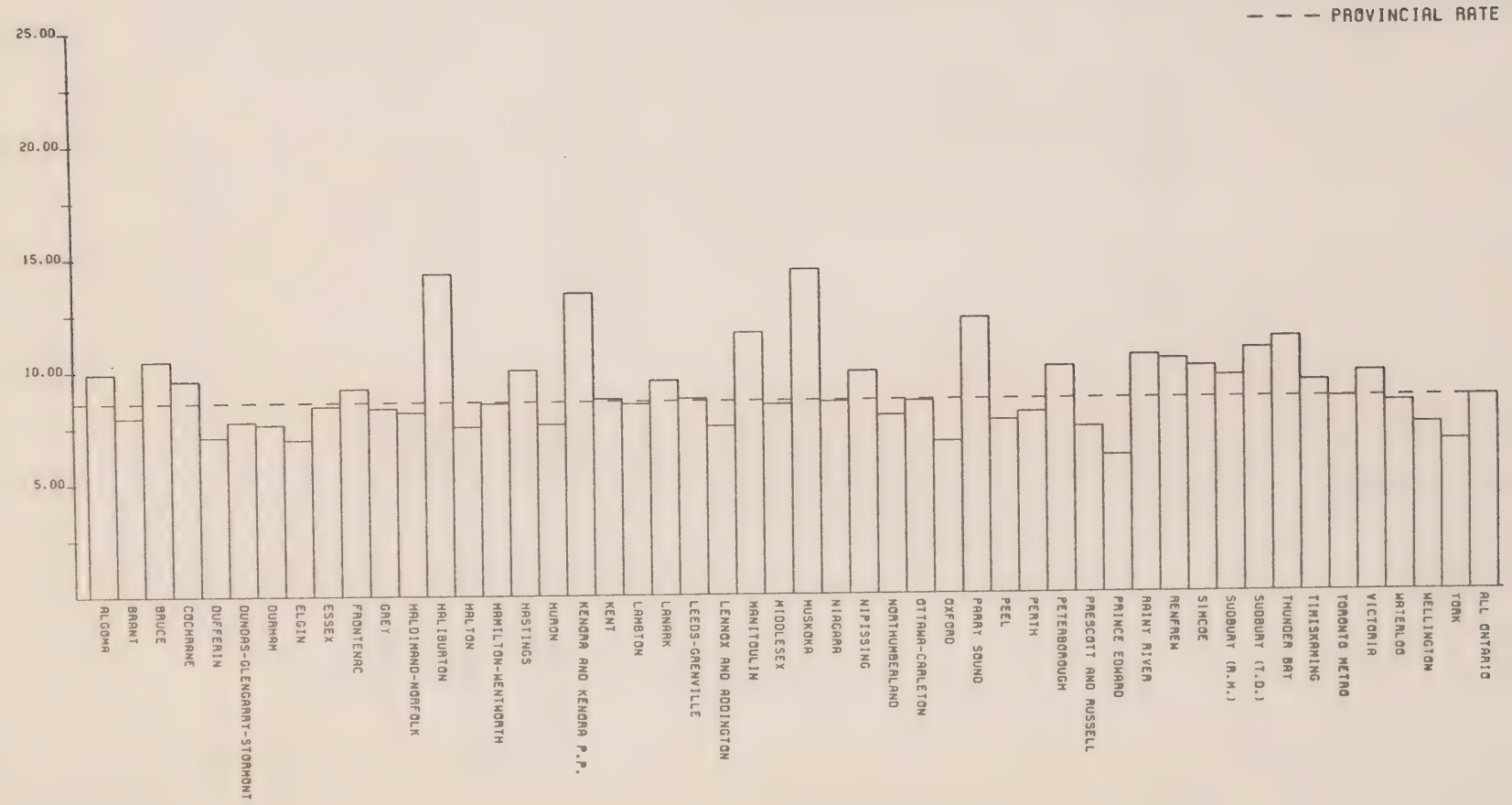

Figure 2

RATES OF ALCOHOL-RELATED OFFENCES
ONTARIO COUNTIES 1978

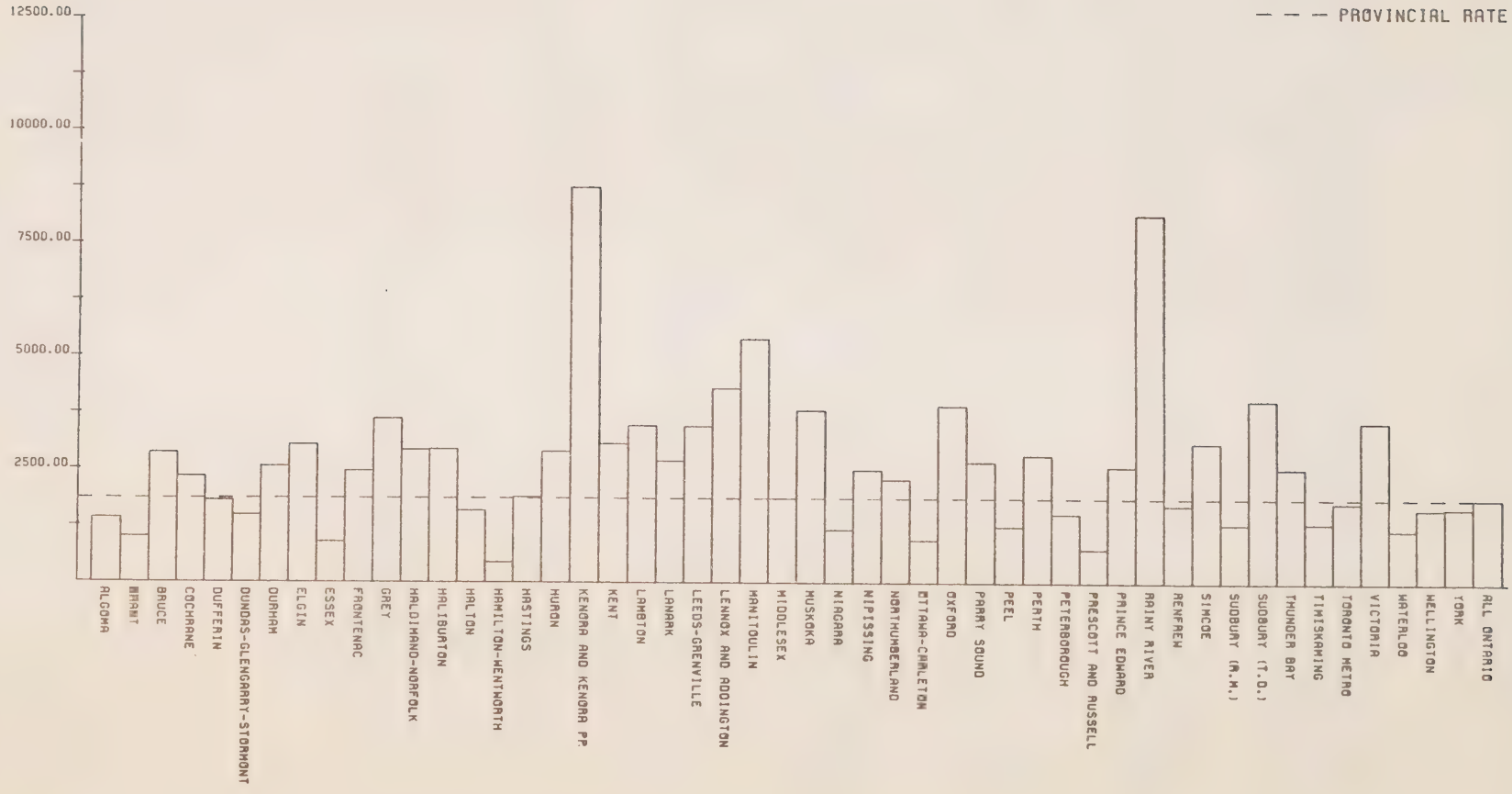

Figure 3

RATES OF ALCOHOL MORBIDITY
ONTARIO COUNTIES 1978

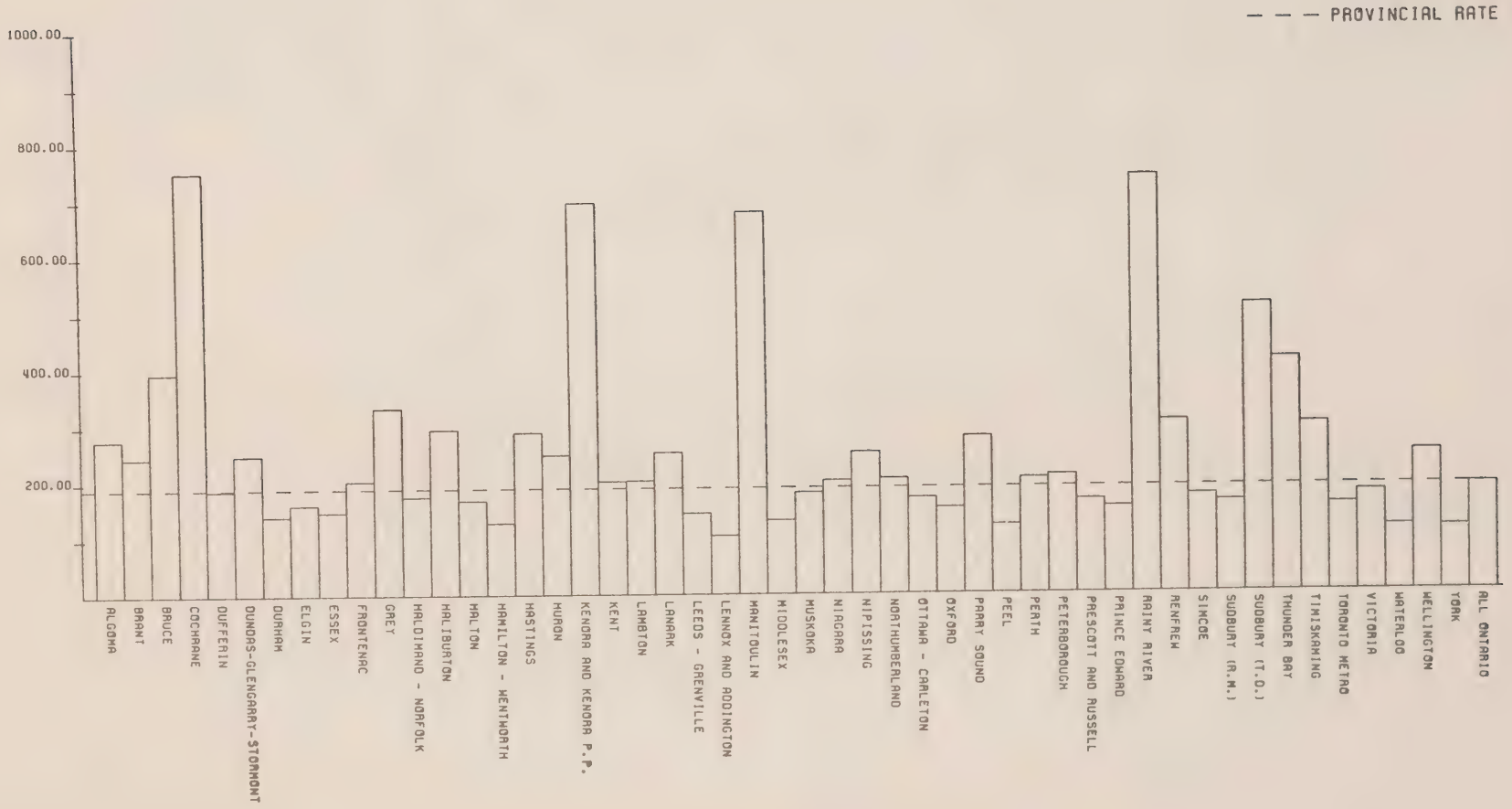

Figure 4

RATES OF ALCOHOL MORTALITY
ONTARIO COUNTIES 1978

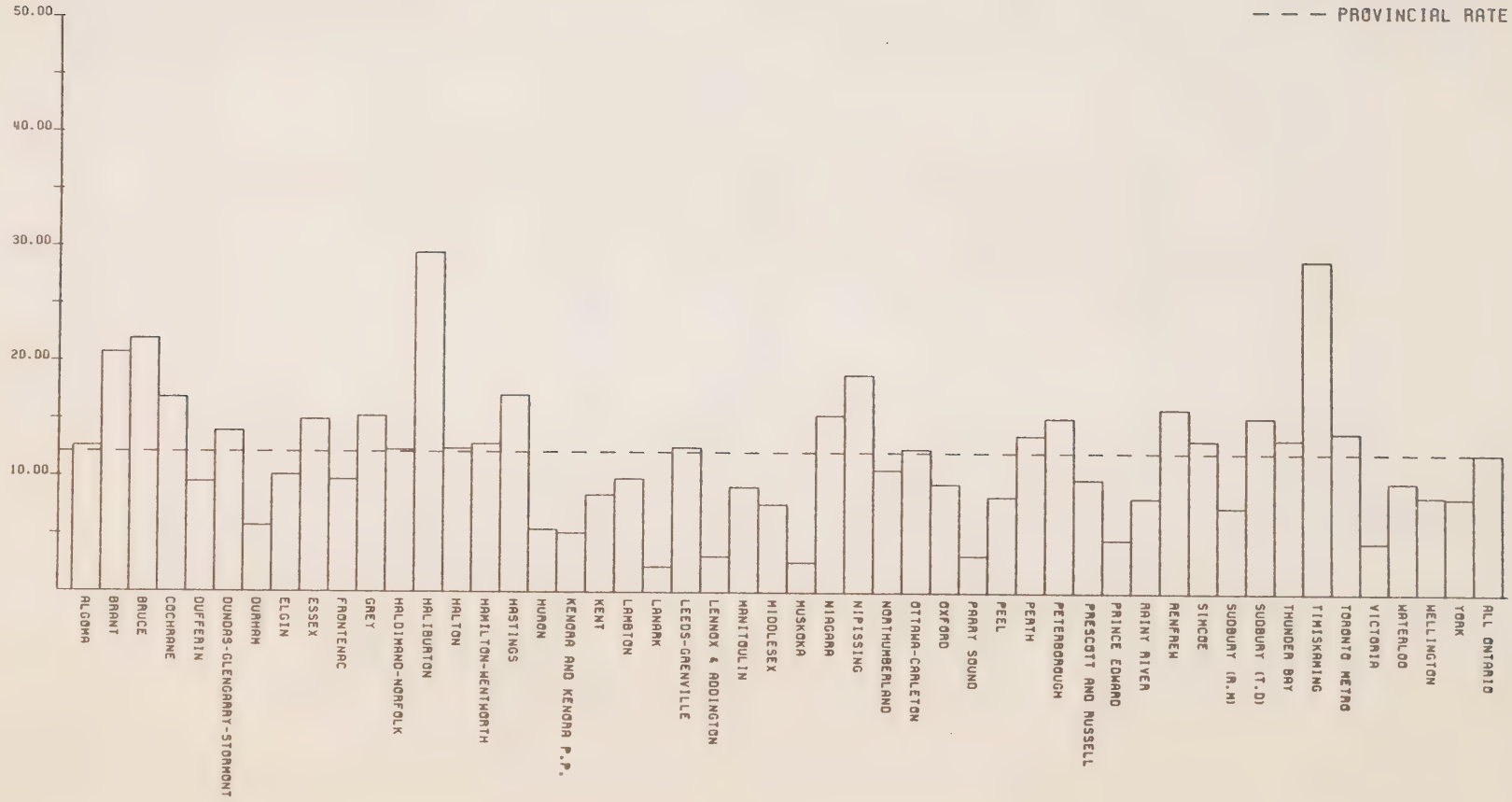

Figure 5

RATES OF DRUG-RELATED OFFENCES
ONTARIO COUNTIES 1978

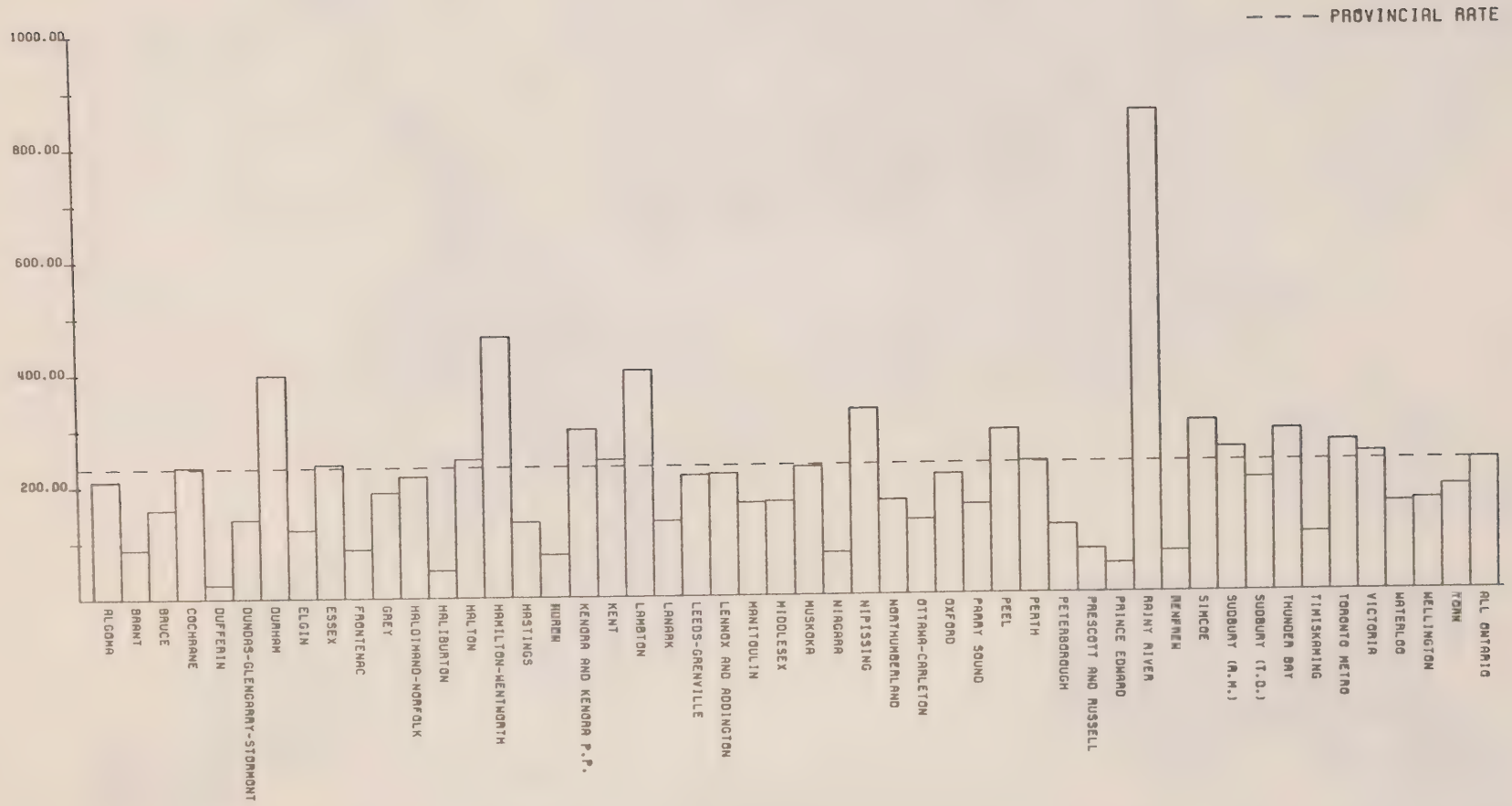

Figure 6

RATES OF DRUG MORBIDITY
ONTARIO COUNTIES 1978

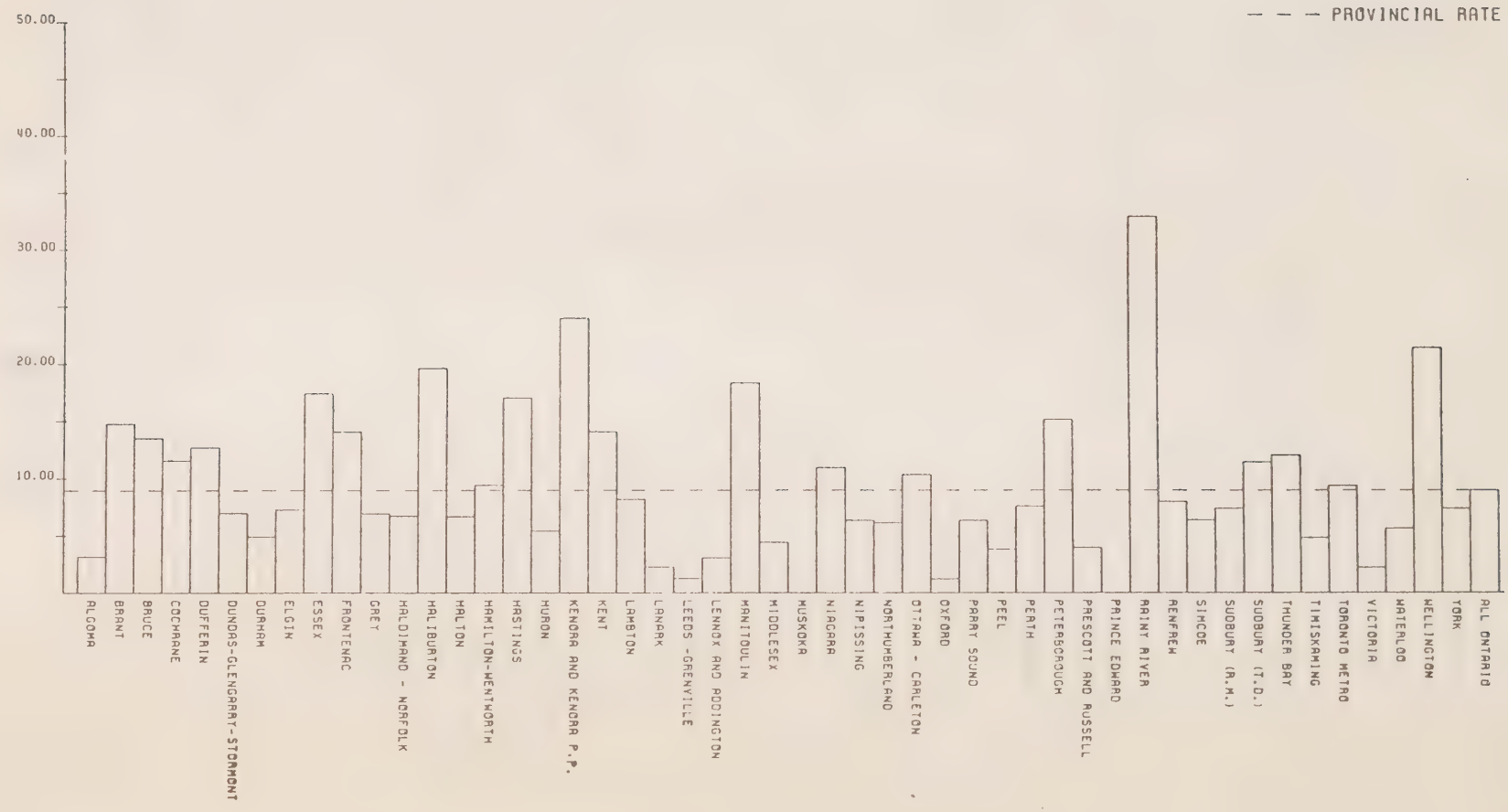

FIGURE 7: MAP OF SEVERITY OF ALCOHOL AND DRUG PROBLEMS IN ONTARIO BY COUNTY, 1978

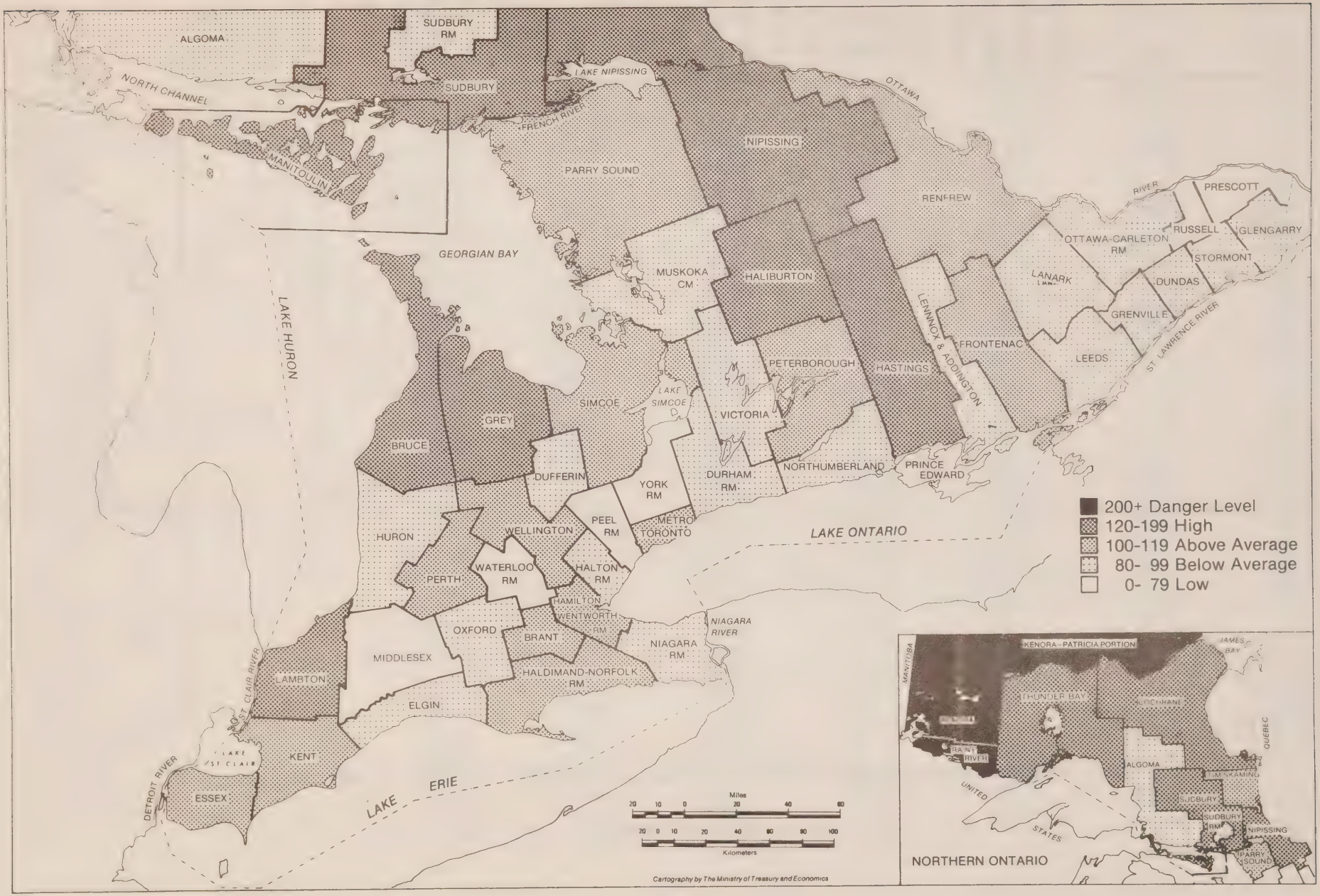

Figure 8

DISTRIBUTION OF ONTARIO COUNTIES BY COMPOSITE ALCOHOL AND DRUG INDEX NUMBER, 1978

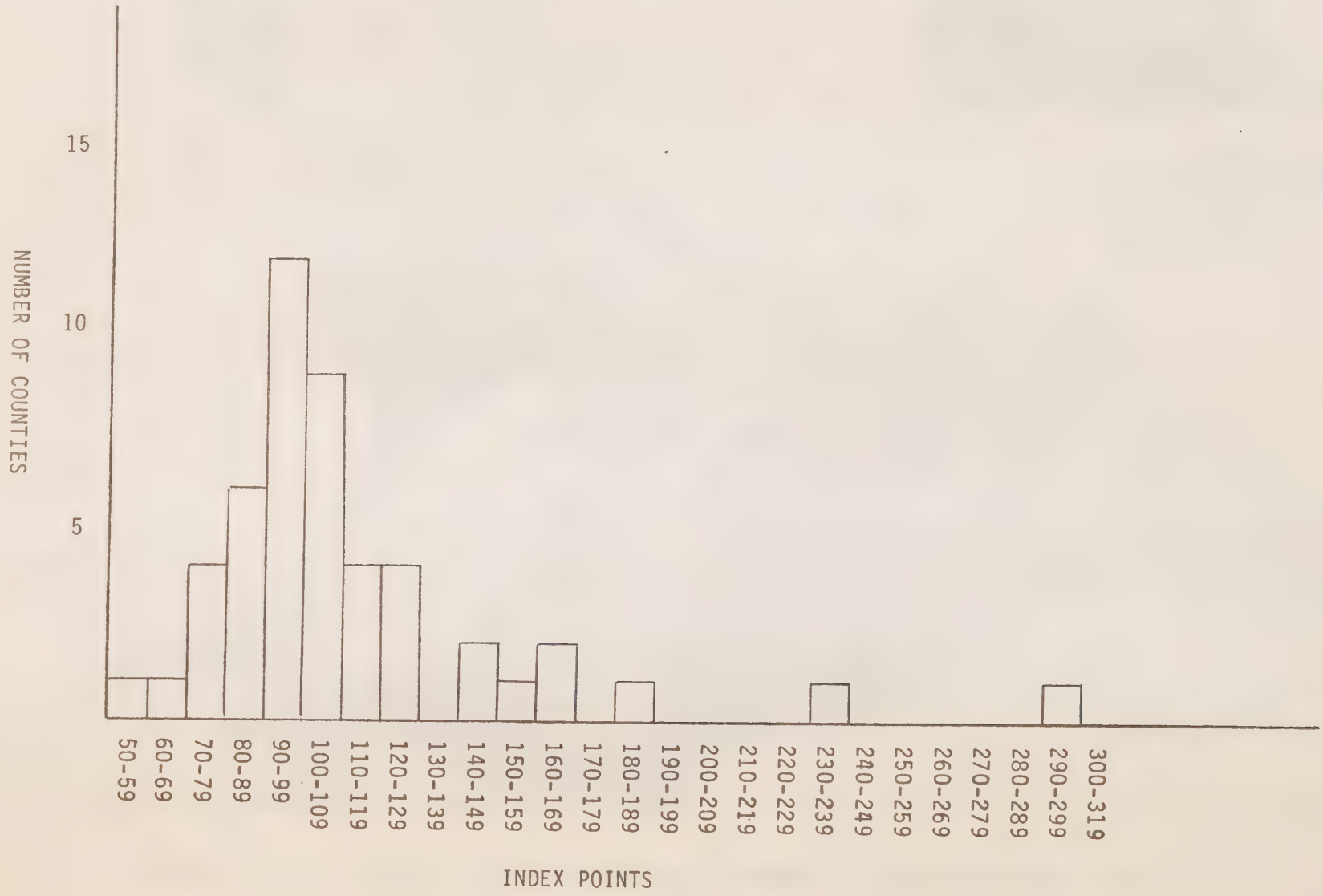

TABLE 9: INDEX OF SEVERITY OF ALCOHOL AND DRUG PROBLEMS, ONTARIO, 1978

(All Ontario = 100.0)

COUNTY	ALCONS	ALCOFF	ALCMORB	ALCMORT	DRG_OFFE	DRG_MORB	MEAN INDEX
ALGOMA	114.9	76.2	146.7	104.1	90.4	35.1	94.6
BRANT	92.5	54.2	129.6	171.1	37.8	165.1	108.3
BRUCE	121.4	153.8	208.9	181.0	68.4	151.1	147.4
COCHRANE	111.3	125.9	396.9	138.8	101.3	129.2	167.2
DUFFERIN	82.2	97.0	99.1	78.5	10.9	142.1	85.0
DUNDAS-GLENGARRY-STORMONT	90.1	79.8	131.5	114.9	60.9	76.0	92.5
DURHAM	88.5	138.1	74.8	47.1	171.1	54.8	95.7
ELGIN	80.6	103.7	85.0	83.5	52.5	81.0	91.0
ESSEX	97.8	48.1	78.2	123.1	102.5	194.5	107.4
FRONTENAC	106.9	132.7	107.2	80.2	37.5	157.0	103.6
GREY	96.7	194.5	175.4	125.6	81.0	77.3	125.1
HALDIMAND - NORFOLK	94.7	157.7	92.5	101.7	93.2	74.8	102.4
HALIBURTON	165.9	158.5	155.5	243.0	21.1	219.2	160.5
HALTON	87.2	85.1	88.6	102.5	106.2	74.3	90.7
HAMILTON-WENTWORTH	99.0	23.7	67.9	105.8	199.8	105.1	100.2
HASTINGS	116.0	101.1	152.5	140.5	57.9	190.4	126.4
HURON	88.2	155.2	131.0	44.6	32.7	60.6	85.4
KENORA AND KENORA P.P.	155.6	471.3	366.8	42.1	126.4	267.7	238.7
KENT	101.0	164.8	106.5	69.4	105.3	157.2	117.4
LAMBTON	98.4	186.3	107.0	81.0	173.4	90.9	122.8
LANARK	110.3	144.8	133.3	16.2	57.7	24.9	81.5
LEEDS -GRENVILLE	101.2	185.9	76.1	103.3	92.8	14.0	95.5
LENNOX AND ADDINGTON	86.9	231.2	55.0	25.6	93.7	34.2	87.8
MANITOULIN	134.7	289.7	357.8	75.2	70.9	204.6	188.8
MIDDLESEX	97.8	100.2	69.5	62.8	72.1	49.3	75.3
MUSKOKA	167.0	204.5	95.1	21.5	98.1	0.0	97.7
NIAGARA	99.1	62.7	106.3	126.4	32.3	121.8	51.4
NIPISSING	114.5	133.9	132.8	155.4	141.8	70.2	124.8
NORTHUMBERLAND	91.9	122.6	107.7	87.6	72.1	68.0	91.7
OTTAWA - CARLETON	99.1	50.7	89.9	102.5	57.0	115.3	85.8
OXFORD	78.2	210.4	80.5	77.7	91.6	13.2	91.9
PARRY SOUND	141.5	143.6	146.9	26.4	68.0	70.6	99.5
PEEL	88.7	67.0	64.0	68.6	125.0	42.4	75.9
PERTH	92.9	151.2	107.8	112.4	100.9	84.5	108.3
PETERBOROUGH	116.3	81.7	110.6	124.8	51.6	168.7	108.9
PRESCOTT AND RUSSELL	85.0	39.6	87.5	81.0	33.1	44.1	61.7
PRINCE EDWARD	70.3	138.1	80.3	38.0	21.8	0.0	58.1
RAINY RIVER	121.6	438.3	390.3	67.8	367.6	367.0	292.1
RENFREW	119.6	91.9	160.5	131.4	30.9	89.0	103.9
SIMCOE	115.8	166.1	91.7	109.1	130.5	71.0	114.0
SUDBURY (R.M.)	111.0	69.6	85.2	61.2	109.9	82.2	86.5
SUDBURY (T.D.)	125.0	217.0	269.0	125.6	86.7	127.4	158.5
THUNDER BAY	130.5	135.9	218.2	109.9	123.6	134.0	142.0
TIMISKAMING	107.9	70.8	157.5	238.0	44.5	53.7	112.1
TORONTO METRO	99.5	95.2	81.8	114.9	114.7	104.6	101.8
VICTORIA	112.8	191.1	93.4	36.4	105.6	24.7	94.0
WATERLOO	97.3	62.6	60.6	79.3	67.3	62.6	71.6
WELLINGTON	85.9	87.8	130.9	69.4	69.3	238.6	113.7
YORK	77.2	89.1	59.6	68.6	79.8	82.4	76.1

TABLE 10: ECONOMIC AND SOCIAL INDICATORS: DEFINITIONS OF STATISTICAL SERIES

Economic Indicators		Definition
- per capita disposable income	(DISINC 78)	- rate of total income of a resident of a given area after payment of direct taxes per population
- income per taxpayer	(TAXINC 78)	- rate of total income per tax return
- per capita retail sales	(RETAIL 78)	- rate of retail sales per population
Social Indicators		
- employment	(TAXRET 78)	- rate of tax filing income earners per population
- industrialization	(MANEMP 77)	- rate of persons employed in manufacturing industries per population
- urban concentration	(URBRUR 77)	- rate of manufacturing payroll relative to farm cash income
- average size of household	(NOHOUS 78)	- rate of persons relative to numbers of households

TABLE 11

CORRELATIONS OF INDICATORS OF ALCOHOL AND DRUG PROBLEMS AND OF ECONOMIC AND SOCIAL CONDITIONS

SPEARMAN CORRELATION COEFFICIENTS / PROB > |R| UNDER HO:RHO=0 / N = 49

	ALCONS	ALCOFF	ALCMORB	ALCMORT	DRG_OFFE	DRG_MORB
RETAIL78	0.39887 0.0045					
DISINC78		-0.42840 0.0021	-0.31686 0.0265		0.43621 0.0017	
TAXINC78	-0.24324 0.0922	-0.39589 0.0049	-0.37344 0.0082		0.36058 0.0109	
TAXRET78						
MANEMP77	-0.42656 0.0022	-0.28447 0.0476	-0.44065 0.0015		0.24237 0.0934	
URBRUR77	0.38155 0.0068	-0.28523 0.0470			0.40332 0.0041	
NOHOUS78						

20199